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**A NEW BEGINNING OR THE END OF  
AN ERA? FUTURE USE OF THE C-130  
FOR THE AIRBORNE FORCIBLE  
ENTRY CAPABILITY**

**GRADUATE RESEARCH PAPER**

**Cameron W. Torrens, Captain, USAF**

**AFIT/GMO/LAL/98J-16**

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**GRADUATE RESEARCH PAPER**

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Master of Mobility

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Abstract

In 1997, the Air Mobility Command Commander (AMC/CC) chartered a Tiger Team to plot the future course of the C-130 in Air Mobility Command (AMC). One key result of the Tiger Team's efforts was a recommendation to maintain the crew members of the C-130 100% airdrop qualified. Recent discussions between Headquarters, Air Mobility Command leadership and C-130 operational leadership had generated spirited debate over what the role of the C-130 should be in the command. Part of the headquarters leadership argued the C-130 fleet consists of a large number of aircraft spending an inordinate amount of time training in a role that will most likely never be used (mass airdrop of personnel and equipment). In fact, there are only two CONPLANS in the military that are based on theater airdrop of mass personnel. The C-130 could be used more effectively as a "revenue generator" for the command, flying Transportation Working Capital Fund (TWCF) missions. Operational leadership countered this argument by pointing out that mass airdrop is the C-130's "bread and butter"—a mission with deep historical roots and doctrinal support. It is understood that the C-130 historically delivered the Army "on-time and on-target". Doctrine has supported and continues to support the airborne forcible entry capability.

The purpose of this paper is to study this argument. History and doctrine appear to support the use of the C-130 in the forcible entry capability. Ill-defined requirements and a diminishing capability in forcible entry resources support the argument that the

C-130 might be better used in a different role. The conclusion examines several alternatives that could logically result from this debate. These include: 1) the elimination of mass airborne personnel drops as a valid method of forcible entry 2) maintaining this capability, but eliminating the role of the C-130 in this mission, and 3) maintenance of the status quo—continued C-130 support for the airborne division.

# A NEW BEGINNING OR THE END OF AN ERA? FUTURE USE OF THE C-130 FOR THE AIRBORNE FORCIBLE ENTRY CAPABILITY

## I. Introduction

Rapidly changing world events and broad changes in military strategy and doctrine have focussed attention on Air Mobility Command's newest member—the C-130 Hercules. Traditionally known for its “Herculean” efforts in supporting the United States Army in the tactical airdrop role, the aging aircraft finds its core mission under close scrutiny by its new headquarters.

Air Force leaders at Air Mobility Command note the C-130 flies a disproportionate number of training and joint airborne air transportability training (JA/ATT) missions (sorties funded by Air Force Operations and Maintenance Funds). Critics argue the C-130 should adjust its roles and missions to fly more missions that generate Transportation Working Capital Funds (TWCF). In this manner the C-130 would be making money for the command as opposed to costing money. Leaders believe the decline of the Soviet Union and corresponding shift in Army doctrine from the AirLand battle towards force projection has eliminated the necessity to maintain 100% airdrop-qualified aircrews in the C-130 force.

Proponents of the status quo argue that the airdrop mission of the C-130 has historically proven critical. Since the introduction of airborne tactics in World War II, airdrop has been used both as a striking force and as a deterrent. Joint and Army doctrine recognize the value of this unique capability and have included airborne assaults in

descriptions of future battle. Finally, there is a requirement for airdrop. The question remains as to whether or not there is a C-130 requirement for airdrop.

Strategic Brigade Airdrop (SBA) and Direct Delivery are old concepts still undergoing trial and experimentation. Regardless of the strategic value of these plans, tactical airdrop missions appear to have a valid role in Air Mobility Command—especially in the next decade. As we enter the 21<sup>st</sup> century, a significant shortfall in strategic airlift capacity will force our core strategic airlifters to concentrate their sortie rate on strategic airlift requirements rather than the normal amount of peacetime tactical airdrop training and actual airdrop missions.

Both sides are right. The C-130 cannot takeover the airborne forcible entry role because it is not capable of fulfilling the SBA mission. Strategic airlift cannot assume the entire role because there are not enough aircraft to perform the SBA, or more importantly, the peacetime training requirements to keep the airborne division jump qualified. It is extremely difficult, based on the historical performance of the C-130 and doctrine, not to maintain a C-130 force that is 100% airdrop qualified. Capabilities and requirements, however, do not necessarily support this position. Air Mobility Command must be extremely cautious in its decision of how much of a cut to make, and exactly how the cut should be made.

The purpose of this paper is to identify and discuss the relevant arguments regarding the use of the C-130 and to present several alternatives for its role in airborne forcible entry operations. The paper begins with a history of airborne tactics and the C-130 in an effort to demonstrate the effectiveness of the C-130 as an airdrop platform. Additionally, Joint, Army, and Air Force doctrine will be studied to highlight the



relevance of personnel airdrop as a valid doctrinal concept. Finally, the paper will relate current requirements for personnel airdrop to the capabilities of Air Mobility Command and the C-130 fleet.

The C-130 comes in many models and variations. This paper studies the “slick” C-130s owned by Air Mobility Command—that is, the non-air refuelable version without special operations equipment attached. This paper will not examine the C-130’s vital role in other forms of airdrop, including the delivery of supplies in a logistical or humanitarian role. Instead the focus will remain on the mass airdrop of personnel. Many questions are raised about the division of training time in the C-130 between single-ship and formation airdrop. This paper examines the concept of personnel airdrop as a whole without discussing formation tactics.

Much of the materials relating to intratheater airlift and airdrop requirements, as well as many details of the Strategic Brigade Airdrop, remain classified. In turn, this paper will not attempt to specifically define the number of aircraft and aircrew which should remain airdrop qualified, but rather provide a foundation of research that will allow the command to examine the question in terms of an approximate percentage.

## **II. History**

### **Origin of Tactical Airdrop of Personnel**

The historical origins of tactical airdrop lie in the formation of the troop carrier units of World War II. The invasions of Holland and Greece by German airborne forces generated a doctrinal flurry in the United States. The Army Air Force began to push for a strategy of the deep strategic insertion of airborne forces, while the Army created a parachute jump school in Ft. Benning, Georgia. As training for this new approach to warfare progressed, the Army set up an Airborne Command and the Army Air Force created Air Transport Command to support the Army specifically in "the air movement of airborne troops, glider infantry and parachute troops" (Boston, 1982:3,4). Later titled Troop Carrier Command, the formation of this command served as an airlift doctrine landmark. Troop Carrier Command was responsible for intratheater airlift and airdrop while Air Ferrying Command (later known as Air Transport Command, Military Air Transport Service, Military Airlift Command, then Air Mobility Command) retained the responsibility for intertheater airlift (Boston, 1982:2-4).

This initial division of airpower, between tactical and strategic airlift initiated a 50-year conundrum for the Air Force. The separation of tactical airlifters from strategic airlifters allowed the troop carriers the independence to develop their own tactics and doctrine. At the same time, the dissolution of the Troop Carrier Command in 1946 disrupted the stability of the tactical airlift community. Tactical airlifters bounced back and forth between tactical commands and airlift commands throughout the rest of the century.

Early attempts at airdrop of forces during World War II met with marginal success. While the concept appeared valid, increased training of both aircrew and airborne forces, as well as Air Force command of the operation until the troops hit the ground were the valuable lessons learned. The Normandy invasion was the setting for the largest airborne attack in history thus far. The ambitious night airdrop met with marginal success. Of the 13,000 troops dropped, less than 10% landed on target. However, 60% of the forces landed within two miles of their respective drop zones. As the invasion progressed, tactical airlifters increasingly found it difficult to continue training for airborne operations as the theater demands for airlift of supplies and medical evacuations occupied the majority of their missions.

The subsequent air invasion of Holland proved to be the troop carrier's greatest tactical success and one of the Allies largest strategic failures. The 82<sup>nd</sup> and 101<sup>st</sup> divisions were able to secure their bridgeheads following a successful drop, but were unable to defend their positions due to the loss of surprise and lack of sufficient reinforcement (USAF Historical Studies No. 97, 1956:22).

The final major airborne offensive of the war demonstrated the tactical improvements made by the Troop Carrier Command. Less than 5% of the force was lost during the airborne assault across the Rhine in March 1945. The elements maintained their formations, put the troops on target, and successfully completed their objectives (Boston, 1982:13). While certain Air Force leaders continued to promote the concept of "huge fleets of transport aircraft dedicated to strategic airborne divisions" (Moore, 1946:File No. 546.04), the concept of responsive theater airlift had proven itself in the heat of battle.

Following the war, the Army advocated the creation of a joint airborne forces command but encountered a newly independent Air Force intent on conceptually distancing itself as far as possible from the Army (Boston, 1982:14). The Air Force elected to put the remaining troop carriers within the small Tactical Air Command. The distinctive link of troop carrier aviation with airborne operations, as well as the division between tactical and strategic airlift, began to dim as troop carriers augmented Military Air Transport Service during the Berlin Airlift (Boston, 1982:15).

Although contingency plans for mass airborne drops were prepared for the Korean War, only two actual troop drops were made. Instead, the focus for tactical airlift in this conflict was on the efficient movement of troops and supplies within the theater. The combination of rugged, short runways and the desire by the Army to maintain some element of control over their logistical resupply led the Army to begin developing helicopters as a source of organic theater airlift. In response to a perceived encroachment on their own roles, the Air Force began development of first, the C-123 Provider, and then the C-130 Hercules (Boston, 1982:17).

### **Development of the C-130**

Theater roles and missions were not the only factors driving the development of the C-130. Pentagon planners, after studying the six long weeks it took to airlift two Army divisions from the continental U.S. (CONUS) to the Korean front, insisted the military develop "a powerful air transport capable of swiftly airlifting troops, supplies and equipment to any part of the world, and then have complete freedom from concrete

(Dabney, 1986:83). This vision of the next medium-size transport aircraft evolved in step with changing U.S. military doctrine. Rather than scatter large armies throughout the world, current doctrine began to emphasize rapid mobility (Dabney, 1986:83).

Rapid mobility was exactly what the C-130 delivered. In 1958, the C-130 was used to deliver troops to Beirut and Taiwan during crises in both countries (Launius, 1989:1). The capability of the C-130 was aptly demonstrated in Operations DRAGON ROUGE and DRAGON NOIR when U.S. C-130s dropped a total of 576 Belgian paracommandos into the Congo to rescue over 2000 hostages. The paracommandos, after successfully completing their drop, seized control of two airfields and allowed the remainder of the C-130 force to utilize the fields (Dabney, 1986:46).

Vietnam proved to be the conflict that truly validated the utility of the new C-130. In addition to thousands of intratheater airlift and aeromedical evacuation sorties, the C-130 was often used to airdrop troops and supplies within the theater. In 1965, 15 C-130s airdropped 1,100 Vietnamese troops into combat at the Michelin Rubber Plantation (Launius, 1989:3). Early 1967 found C-130s teaming with helicopter assault forces to deliver 780 combat troops and 10 equipment loads in Operation JUNCTION CITY. Khe Sanh, A Luoi and An Loc all depended on the supply airdrop capability of the C-130 throughout the next five years as they respectively fell under siege (Launius, 1989:4,5). The new aircraft came under fire repeatedly during the Vietnam conflict, proving the value of its rugged design and redundant systems. Before the conflict, Army leadership had pushed for the acquisition of organic airlift. They envisioned the Air Force delivering men and materials to the theater; where the Army would use its own aircraft to employ forces and supplies where needed. The performance of the C-130 and

its effective integration into Army operations put an end to the debate over the Air Force's airlift role within the theater.

The conclusion of the conflict led to several studies on the efficiency of the air mobility effort. As the military searched for methods to comply with mandatory downsizing, the perennial question of why theater airlift remained under the Tactical Air Command while strategic airlift remained under Military Airlift Command once again rose its head. In 1974, in response to a report compiled at Project CORONA HARVEST, the Office of the Secretary of Defense consolidated all airlift resources under Military Airlift Command (Underwood, 1989:9). As Army support for the consolidation was critical, the Air Force was determined to preserve the "tactical" nature of the C-130. C-130 units were allowed to retain the word "Tactical" in their designations, and a USAF Airlift Center was created at Pope Air Force Base Command (Underwood, 1989:18) (co-located with the 82<sup>nd</sup> Airborne Division).

While the C-130 flying units transferred to Military Airlift Command, the Tactical Air Command support units did not. It was several years before MAC was able to train and man its enroute support system to maintain the C-130 aircraft. Unfortunately, this initial failure to "welcome" the C-130 into the command created a Big MAC-Little MAC perception (McCants, 1981:209-210) among tactical airlifters that some argue still persists to this day.

## **C-130 and Military Airlift Command**

The C-130 was now under MAC command and available for use as a DOD transportation resource under the Airlift Service Industrial Fund (ASIF). Designed in 1958, this system recognizes that the readiness training required by airlift forces produces a by-product—airlift. Through the use of a revolving fund, ASIF requires DOD users of airlift to budget and pay for the right to use it (MAC Comptroller Office, 1990:1). Since 1958, the ASIF's name has changed to the Defense Business Operating Fund (DBOF-T) and finally, to its present day name of Transportation Working Capital Fund (TWCF). Under this system, approximately 83 percent of AMC's readiness training comes from the TWCF. The balance is funded by the Air Force Operations and Maintenance (O&M) appropriation. When DOD airlift requirements under the TWCF are less than AMC's organic capability, the Air Force must budget O&M funds for the training it still needs to accomplish (MAC Comptroller Office, 1990:1). Obviously, for AMC to make money for the command it is important to fly as many TWCF sorties as possible. The C-130, however, has a vital support role for the Army that does not fall under the TWCF. When the C-130 flies Joint Airborne/Air Transportability Training (JA/ATT) missions with the Army, it is flying with AMC O&M Funds. Because the Air Force is specifically required to provide this training and also conducts training while performing the mission, the Army does not "pay" money to the Air Force for airdrop training.

The initial introduction of the C-130 to the ASIF program led to concern by theater commanders that they would lose control of theater airlift in deference to the ASIF program (Israelitt, 1976:1). Current debates over the use of the C-130 center on the

amount of time the C-130 spends training for tactical airlift and airland compared with the number of TWCF missions the airframe supports (Kross, 1997).

Airdrops in the seven years following Vietnam were limited to humanitarian operations and joint exercises. Training for the mass airdrop of personnel continued to remain a high priority as the Army AirLand battle doctrine in Europe saw this tactic as a key method of force projection and a valuable deterrent against a Soviet invasion. In 1984, C-130s and 141s were used to airdrop the advance force in support of the invasion of Grenada. Five years later, C-130s dropped airborne forces into Panama in support of Operation Just Cause (Launius, 1990:12,15).

### **C-130 in a Post-Cold War Environment**

Operations DESERT SHIELD and DESERT STORM once again proved the value of the C-130 as the intratheater airlifter of the Air Force. In Southwest Asia, 149 C-130s flew 13,900 missions hauling 242,000 passengers and 174,000 tons of cargo. The C-130 was a vital spoke in the DESERT EXPRESS logistics distribution system. During January of 1991, C-130s on 1,175 missions transported 14,000 passengers and 10,000 tons of cargo for the 18<sup>th</sup> Airborne Corps from King Fahd to Rafha in northern Saudi Arabia near the Iraq border in support of the defining "Hail Mary" maneuver (Matthews, 1996:68,69). A mass airborne assault on Iraq was studied. The plan involved over 100 C-130s in combat formation. Leadership finally determined the logistics of the concept were too cumbersome and risk of loss of life was too high. The plan was scrapped (Ogden, 1997).



In 1990, C-130s in Germany and Japan were transferred to EUCOM and PACOM. This move was the result of a hard push by General Merrill McPeak, the PACAF commander, to move control of theater airlift assets to the theater commander. This initial transfer of control laid the groundwork for a gradual restructuring of how the C-130 would fit into the newly formed AMC and ACC (History of Air Mobility Command, 1 Jun 92-31 Dec 94:52-89).

General McPeak moved from PACAF commander to Air Force Chief of Staff and introduced a new concept—the composite wing. The idea was to organize bases with a mix of aircraft capable of heading off to the fight together. Pope Air Force Base, North Carolina was the trial case. F-16s, A-10s and C-130s under Air Combat Command made up the first composite wing. Only one squadron of C-130s transferred to ACC, while the remaining two C-130 squadrons remained in AMC as a tenant unit at Pope Air Force Base. This shuffling of assets was monitored closely by the 18<sup>th</sup> Airborne Corps, who obviously had a vested interest in maintaining the current level of airborne support for Ft. Bragg (History of Air Mobility Command, 1 Jun 92-31 Dec 94:52-89).

Although the shift of C-130 control to the theater and the development of the composite wing were driven by General McPeak's policy, the concept of moving C-130 control of all state-side C-130s came from General Ronald Fogleman, commander of Air Mobility Command. U.S. Atlantic Command had recently redefined its mission from a Soviet-based posture to that of the responsibility of training CONUS-based forces to deploy and fight. General Fogleman believed that CINCLANTCOM, whose theater included the CONUS, deserved the same control over theater airlift as his counterparts overseas. He also was interested in paring back AMC to its core strategic role. In

February of 1993, with these ideas in mind, General Fogleman recommended to General McPeak the transfer of all stateside C-130s to ACC (a component command of LANTCOM). Over the next eight months, AMC and ACC hammered out arrangements on the level of control each command would have over the C-130s. The JA/ATT planning and control function was left with AMC until ACC could develop this capability. USTRANSCOM was allowed to maintain combatant command of 50 C-130s assigned to ACC in order to support TRANSCOM operations (History of Air Mobility Command, 1 Jun 92-31 Dec 94:52-89).

The concept of the composite wing lost some of its luster after Gen Fogleman replaced Gen McPeak as Chief of Staff. He quickly realized that while the composite wing's provided unique synergies, the logistical cost of separating common blocks of fighters was prohibitive. Gen Fogleman studied the impact of the C-130 on ACC and determined that the economies of scale of moving the C-130 back to AMC were less costly than the duplication of command and control functions necessary to seamlessly integrate the C-130 into ACC. In the spring of 1997, the C-130 was officially transferred to AMC.

### **III. Doctrine**

The rich history of airborne operations and theater airlift helped provide the foundation for the development of airborne doctrine. The Air Force describes doctrine succinctly:

Military doctrine describes how a job should be done to accomplish military goals; strategy defines how it will be done to accomplish national political objectives. (AFDD 1, 1997:4)

The airdrop of personnel is a vital part of joint and Army doctrine. The following section will examine key doctrinal publications of the joint community, the Army, and the Air Force.

#### **Joint Vision 2010**

Joint Vision (JV) 2010 was published by the Joint Staff and serves as a conceptual framework for each service to determine the joint direction the military is going. The document's predictions of future state and estimates of the strategies required to cope with that state allow each service to independently develop doctrine and programs that relate to JV 2010 goals. The following section summarizes key tenets of JV 2010.

The key characteristic of the 21<sup>st</sup> century military will be full-spectrum dominance. In pursuit of this characteristic, JV 2010 developed four operational concepts for the military. These are: dominant maneuver, precision engagement, full-dimension protection, and focused logistics. The fundamental strategic concept of the military force remains the same as the National Military Strategy—power projection.

This Joint Staff vision document is broad by necessity and does not focus on particular operational concepts. Forced entry or airborne operations are not discussed. In fact, the document questions the soundness of the riskier operational tactics of war:

The American people will continue to expect us to win in any engagement, but they will also expect us to be more efficient in protecting lives and resources while accomplishing the mission successfully. Commanders will be expected to reduce the costs and adverse effects of military operations, from environmental disruption in training to collateral damage in combat. Risks and expenditures will be even more closely scrutinized than they are at present. (Joint Vision 2010, 1994:1)

Gen Colin Powell left his position as Chairman of the Joint Chiefs of Staff prior to the development of JV 2010. His view of forcible entry foreshadowed the dynamic concepts of JV 2010:

Forcible entry operations can strike directly at enemy centers of gravity and can open new avenues for military operations. Forcible entry can horizontally escalate the operation, exceeding the enemy's capability to respond. In many situations, forcible entry is the only method for gaining access into the area of operations or for introducing decisive forces into the region. (Powell, 1992:16,17)

But he also noted that forcible entry operations are normally complex and risky—the very characteristic of an operation that JV 2010 highlighted.

## **Joint Publication 3-0, Doctrine For Joint Operations**

Joint Publication 3.0, Doctrine For Joint Operations, was published in 1995 and discusses the strategic context of joint operations. A discussion on the fundamentals of joint operations is summarized in this section and defines the levels of war and the command and control relationships involved with each level. The section dedicated to planning for joint operations will be discussed in the requirements portion of this paper. The core chapter in this publication relating to forcible entry is found in Joint Operations In War. Airdrop as a method of forcible entry is inferred under the category of considerations at the outset of combat. The publication provides forcible entry as a method of countering opposition while projecting force. Often, forcible entry serves as the sole method of obtaining access into a theater. The tactic gives commanders unique opportunities to gain and maintain the initiative at the outset of conflict.

Joint Publication 3-0 outlines the key characteristics of forcible entry as follows:

- Forcible entry operations are normally joint in nature and include airborne, amphibious, and air assault delivery options.
- Forcible entry is normally complex and risky.
- Operations Security (OPSEC) and deception are critical to the success of forcible entry.
- Special Operations Forces may precede forcible entry troops.
- Sustainment requirements for forcible entry provide a formidable challenge.
- Unity of effort is critical.

## **Joint Publication 3-17, Joint Tactics, Techniques, and Procedures for Theater Airlift Operations**

Joint Publication 3-17, Joint Tactics, Techniques, and Procedures for Theater Airlift Operations, is written to provide the fundamental principles and guidance for the conduct of theater airlift operations across the spectrum of military operations. The publication's scope includes command and control and planning considerations for both airdrop and airland operations. Airland and aerial delivery are defined as concepts. The following summary is derived from Joint Pub 3-17.

This publication is the first that highlights the advantages of airland delivery vice aerial delivery. Airland delivery to a runway or landing zone allows a greater degree of unit integrity and capability to rapidly deploy units than the aerial delivery method. In addition, risk of equipment damage and personnel injury is lower for the airland option. One of the advantages of this method is that airland requires minimal specialized training and equipment for transported personnel. Training soldiers to jump from aircraft costs the Army significant dollars and time. Finally, the absence of special airdrop equipment in the airland option increases the allowable cargo load (ACL).

The disadvantages of airland delivery, however, are the factors that make aerial delivery such an important capability. Airland delivery requires level airfields or unobstructed landing zones which may not be available for the current operation. Staggering aircraft into landing zones may increase the mission interval. Aerial delivery masses combat forces and materiel over an objective area in minimum space and time. Airland delivery often requires ground support to handle the delivery assets while airdrop

allows the aircraft to immediately depart the objective area. The delivery of forces and equipment to a landing zone can prolong and intensify the exposure of aircraft to theater threats. However, it should be noted that aerial delivery, especially when conducted in a large formation, also represents an operational risk as the aircraft are exposed to threats during ingress and egress. The aerial delivery exposure to threat is inherently more dangerous because of the potential to not only lose transportation assets, but also the combat forces inside the aircraft. Finally, JP-3-17 notes that aerial delivery may be the option of choice when visibility prohibits delivery of forces via airland delivery. Currently, the C-130 with the Adverse Weather Aerial Delivery System (AWADS) is the only aircraft certified to drop personnel in such conditions. The publication emphasizes that planners should view airland delivery as the option of first choice for most air movements.

Joint Publication 3-17 is the first publication that defines the role of the Air Force in theater airlift stating, "the bulk of theater airlift is normally done by fixed-wing transports provided by the Air Force component" (Joint Pub 3-17, 1995:I-14). This publication is vital to understanding the role of the C-130 and its airdrop mission because the airdrop mission of dropping personnel is specifically defined as a possible theater tactic. Theater assets are normally under the operational control of the theater commander. This is a common relationship for the C-130. When a contingency begins, C-130s normally undergo a change of operational control (CHOP) to the theater commander. Strategic airlift forces are not normally CHOPed to the theater. During Operation PROVIDE PROMISE, the humanitarian resupply to Bosnia, C-141s made history by CHOPing to the European theater. The C-17 also CHOPed during Operation

JOINT ENDEAVOR, the introduction of IFOR to Bosnia, although this was actually a change of tactical control rather than operational control (Bruno, 1998). None of these aircraft were used in an airdrop role. The C-5 has never CHOPed to a theater. It seems obvious that if a theater airdrop operation requires strategic assets, then these assets will be made available. However, this use is not based on current doctrine. Theater airdrop plans are currently designed for the C-130, while operations requiring strategic airdrop assets are strategic in nature.

### **Joint Publication 3-18, Joint Doctrine for Forcible Entry**

Joint Publication 3-18, Joint Doctrine for Forcible Entry, is a draft publication defining the role of forcible entry in U.S. military doctrine. This section summarizes this latest draft.

Forcible entry is seizing and holding a military lodgment in the face of armed opposition. Once again, the three forcible entry options are described: amphibious assault, airborne assault, and air assault. The publication outlines the major steps in conducting forcible entry operations through the discussion of command and control responsibilities, operation phases and support elements, logistics requirements and planning, and synchronization and transition. The section of this publication relating to forcible entry capabilities reminds the reader that the commander with forcible entry capability compels the enemy to think and fight differently, even if the forcible entry capability is not used. As long as the enemy believes the capability *may* be used, he will be required to guard and apportion assets against that possibility.



Joint Publication 3-18.1, Joint Airborne and Air Assault Operations (draft), is the core doctrinal publication relating to airborne operations. The publication discusses basic concepts of airborne and air assault operations. The doctrinal overview provides a brief history of the successful use of airborne capabilities and reiterates the vital need for these capabilities. In the discussion of airborne operations, it is noted that airborne forces are capable of conducting operations in support of strategic, operational and tactical objectives.

Airborne capabilities are stated in JP 3-18.1. The publication lists the capabilities of airborne operations as:

- Provide a show of force.
- Seize and hold important objectives until linkup or withdrawal.
- Seize an advance base to further deploy forces or to deny enemy use.
- Conduct raids and attacks in the enemy's battlespace.
- Reinforce units beyond the immediate reach of land forces.
- Deny the enemy key terrain or routes.
- Delay, disrupt and reduce enemy forces.
- Conduct economy-of-force operations.
- Bypass enemy positions and terrain; achieve surprise.
- Attack enemy positions from any direction.
- Perform operations effectively at night.
- Conduct or assist in Noncombatant Evacuation Operations (NEO).

Airborne operations also have several critical limitations. These limitations are important to highlight in this section because they will be discussed in detail in the capabilities section of this paper. The limitations of airborne operations are:

- The airborne forces are dependent on the availability of airlift, fire support, and combat support assets during all phases of the operation.
- Limited air defense, artillery support and mobility until additional assets are introduced to the objective area.
- High vulnerability to enemy attack while enroute to the objective area.
- Adverse weather and environmental conditions.
- Dependent on availability of suitable drop zones.
- High fuel and ammunition consumption rates.

The remainder of the publication describes the airborne operations planning process, summarizes command and control issues, explains sustainment and logistics considerations, and covers airborne and air assault combat operations. In the discussion of airborne support operations it is noted that:

Airborne units can deploy from a CONUS base directly to the objective area. *A more common (emphasis added)* method would be for the airborne unit to deploy first, either to a remote marshalling base or intermediate staging base, before establishing a lodgment into the area of operations. (Joint Pub 3-18.1 (draft), 1997:VI-12)

The concept of the CONUS-objective area movement (or Strategic Brigade Airdrop) is an exception rather than a doctrinal rule. Joint Airborne and Air Assault Operations clearly states that the most common method of employment is through some type of intermediate base. This is important when examining the C-130's role in airborne operations since the C-130 is limited in a strategic role. JP 3-18.1 indicates the C-130's tactical capabilities are still doctrinally relevant with respect to airborne operations.

#### **Joint Publication 4-01.1, Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations**

Joint Publication 4-01.1, Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations, covers the authority and responsibilities of combatant commanders, subordinate joint force commanders, component commanders, and all agencies involved in the deployment and sustainment of a joint force across the range of military options. It also provides guidance for the request, apportionment, and use of this

support during the deliberate or crisis action planning and implementation processes.

The following section extracts pertinent information from JP 4-01.1.

The Army has the largest requirement for common-user airlift. Army airborne forces rely heavily on airlift for deployment, sustainment, employment, and redeployment. Once in theater, the Army airborne forces continue to rely heavily on theater airlift. This publication states that requirements for Army airdrops of forces range in size from a small team to a brigade.

Roles of strategic airlift forces are also defined. JP-4-01.1 defines a key role of strategic airlift forces as augmenting theater or special operations airlift capability. The publication does not define whether this augmentation will be performed under the operational control of the theater commander. It is important to note that this publication requires users to refer to JP 3-17, Joint Tactics, Techniques and Procedures for Theater Airlift Operation for planning any aerial delivery missions. Current doctrine implies aerial delivery is based in theater tactics.

### **Air Force Doctrine**

Obviously the structure of Air Force doctrine closely models joint doctrine. Air Force doctrine is divided into three levels. The basic level, outlined in AFDD-1, is the most fundamental and details the “elemental properties” of air and space power. This core document describes how Air Force forces are organized and employed. AFDD-2 is the core document at the operational level of doctrine—as General Fogleman put it, “a blue version of the Army’s Field Manual 100-5” (Ogden, 1998). AFDD-2 further

expands on the organization of units and command and control. This document takes the principles of basic doctrine and relates them to military action. The tactical level of doctrine is described in the Air Force's "3-level" manuals, which discuss the proper employment of specific weapon systems in order to meet stated objectives.

As expected, Air Force principles of war are no different from the Army or any other branch of service. They serve as universal "truths" of warfare. The principles of war linked to airborne operations in AFDD-1 are mass and maneuver. Mass is the concentration of combat power at the decisive time and place. AFDD-1 recognizes the airman's perspective of mass must include an understanding of airpower's role in assisting in the massing of forces. Maneuver is action which places the enemy at a disadvantage through the use of combat power. The airborne invasion of Panama during Operation Just Cause in 1989 is used in AFDD-1 as an example of both mass and maneuver.

AFDD-1 describes the tenets of airpower as "the fundamental guiding truths of air and space power employment." The tenets of airpower are: 1) requires centralized control and decentralized execution 2) is flexible and versatile 3) produces synergistic effects 4) uniquely suited to persistent operations 5) operations must achieve concentration of purpose 6) operations must be prioritized and 7) operations must be balanced. Using these truths, the Air Force developed six core competencies. These competencies serve as the "basic areas of expertise that the Air Force brings to any activity across the range of military operations". The core competencies are: 1) air and space superiority 2) precision engagement 3) information superiority 4) global attack 5) rapid global mobility and 6) agile combat support.

AFDD-1 encompasses the broad nature of air and space warfare yet tends to focus primarily on airpower as a means to an end. Nowhere in this document are the words airdrop or forcible entry—key concepts found in joint and Army doctrine manuals—to be found. Power projection is addressed under the core competency of rapid global mobility. The core competency of agile combat support does not refer to agile support of another service, rather refers to the organic capability of Air Force support. While joint and Army doctrine appear to mirror one another with reference to forcible entry, Air Force doctrine focuses more on force projection—a capability with more unilateral connotations.

### **Army Doctrine**

In contrast to Air Force doctrine, the Army places great emphasis on the forcible entry capability. Field Manual 100-5 is the document that establishes the Army's operational doctrine. While there are many visions of how the Army will operate in the future (Army After Next, Force XXI, etc.), FM 100-5 Operations remains the Army's key warfighting manual. Besides addressing the operational levels of war, FM 100-5 describes the essence of operations—the fundamental tactical principles and forms of maneuver.

The document is divided into six major subject areas. Part I defines modern conflict and describes the Army's role in that environment. Forcible entry is also defined in this section. Part II establishes the fundamentals that guide Army operations and describes characteristics required of the airborne force. The Army's approach to

application of these fundamentals is outlined in Part III, including a description of operational reach. Part IV provides a practical discussion of the considerations governing the actual conduct of Army operations. The range of operations that enable Army operations is given in Part V and is the key section describing the concept of airborne forcible entry. Finally, the two appendices of 100-5 describe the Army's capabilities and their organizational structure that allows the Army to meet mission requirements.

Forcible entry is defined as a required Army function in the beginning of Part I:

The Army's light forces—airborne, air assault, and light infantry—provide the nation an ability to operate in restricted terrain, such as mountains and jungles where vehicles may find maneuver difficult or impossible. Heavy and light forces together provide a versatile, strategic force projection and forcible entry capability that allows army forces to operate effectively on virtually any land surface in the world. (FM 100-5 (draft), 1997:I-1-2)

The Army believes that these forces are required to fulfill the patterns of operation that are necessary for the success of a force projection Army.

The fundamental operational concept of the Army is to seize the initiative, maintain momentum, and exploit success. The force performs this concept through its five core functions: See, Shape, Shield, Strike, and Move (FM-100-5 (draft), 1997:II-3-1). FM 100-5 emphasizes the importance of shaping friendly forces to be able to perform the function of forcible entry, while maintaining the ability to quickly move extended distances by air. The advantages of dismounted forces delivered by air are agile mobility in terrain not suited for heavier forces (FM 100-5 (draft), 1997:II-4-3). The characteristics of successful Army operations are: initiative, agility, depth, orchestration, and versatility. Obviously, the airborne forces of the Army exhibit these characteristics. The sudden airdrop of a brigade of forces is indicative of the Army's definition of

initiative. Agility is the capability of these forces to be inserted at the place of the theater commander's choosing. Depth is the use of airborne forces to rapidly extend the battlefield. Few operations require the total orchestration necessary to conduct airborne operations. Finally, the insertion of airborne forces is but one method of forcible entry. Amphibious assault and air assault capabilities demonstrate the versatility of American forces in conducting these operations.

Operational reach is an important concept discussed in Part III of FM 100-5.

Operational reach is defined as the distance and duration in which military capabilities can be successfully employed:

Reach is influenced by relative combat power, logistics capabilities, and the geography surrounding and separating opponents. We extend it by locating forces, reserves, bases, and logistics forward; by increasing the range of weapon systems; and by improving lines of communication. Thus, basing is a key factor in operational reach. (FM 100-5 (draft), 1997:III-2-9)

The Army's recognition and succinct definition of operational concept becomes important when examining the Air Force's capability to perform the Strategic Brigade Airdrop. The need for forward staging of aircraft and troops increases the C-130's likelihood of being used in the delivery of airborne troops.

Part V, Enabling Operations is the key chapter of FM 100-5 relating to forcible entry. Enabling operations are examined through the aspects of force projection, information warfare, or integrated warfare. Force projection is defined as a joint operation, recognizing the importance of the Air Force and Navy to deliver Army forces. The two types of entry for force projection are unopposed entry and forcible entry. Forcible entry is defined in the same format as in JP 3-18. FM 100-5 stresses the Army's

role in the airborne and air assault roles of forcible entry. The manual emphasizes the speed and agility characteristic of airborne forces. Forcible entry operations are complex and risky:

Often only hours separate alert and deployment. The demands of simultaneous deployment and combat employment create a unique set of dynamics. Soldiers assigned to the assault units are trained to exercise extraordinary initiative in accomplishing the unit mission despite casualties and the absence of senior leaders. Operations are carefully planned and rehearsed at training areas and in deployment marshalling areas. (FM 100-5 (draft), 1997:V-2-23)

FM 100-5 also recognizes that forcible entry is normally employed in conjunction with special operations.

The Army's core operations manual, FM 100-5, clearly defines airborne assault as part of its operational doctrine. In every aspect of the Army's characteristics, principles, and functions, the airborne assault division plays a key role. Ironically, the document goes into detail referencing the requirement for massive Air Force support for forcible entry operations, while Air Force doctrine fails to mention its role in supporting the Army's mission defined by joint doctrine.

This study of doctrine has demonstrated that while the C-130 does not have a specific doctrinal role in the forcible entry capability, the airframe has many of the characteristics necessary to support the function. The major point in this study is to emphasize the dominant role forcible entry plays in military doctrine.



## **IV. Capabilities**

The following section examines the capabilities of the resources involved in airborne forcible entry. First, the airborne division's role is defined and explained. Next, the current status of the airborne division is outlined. Finally, the current status of the C-130 fleet is discussed.

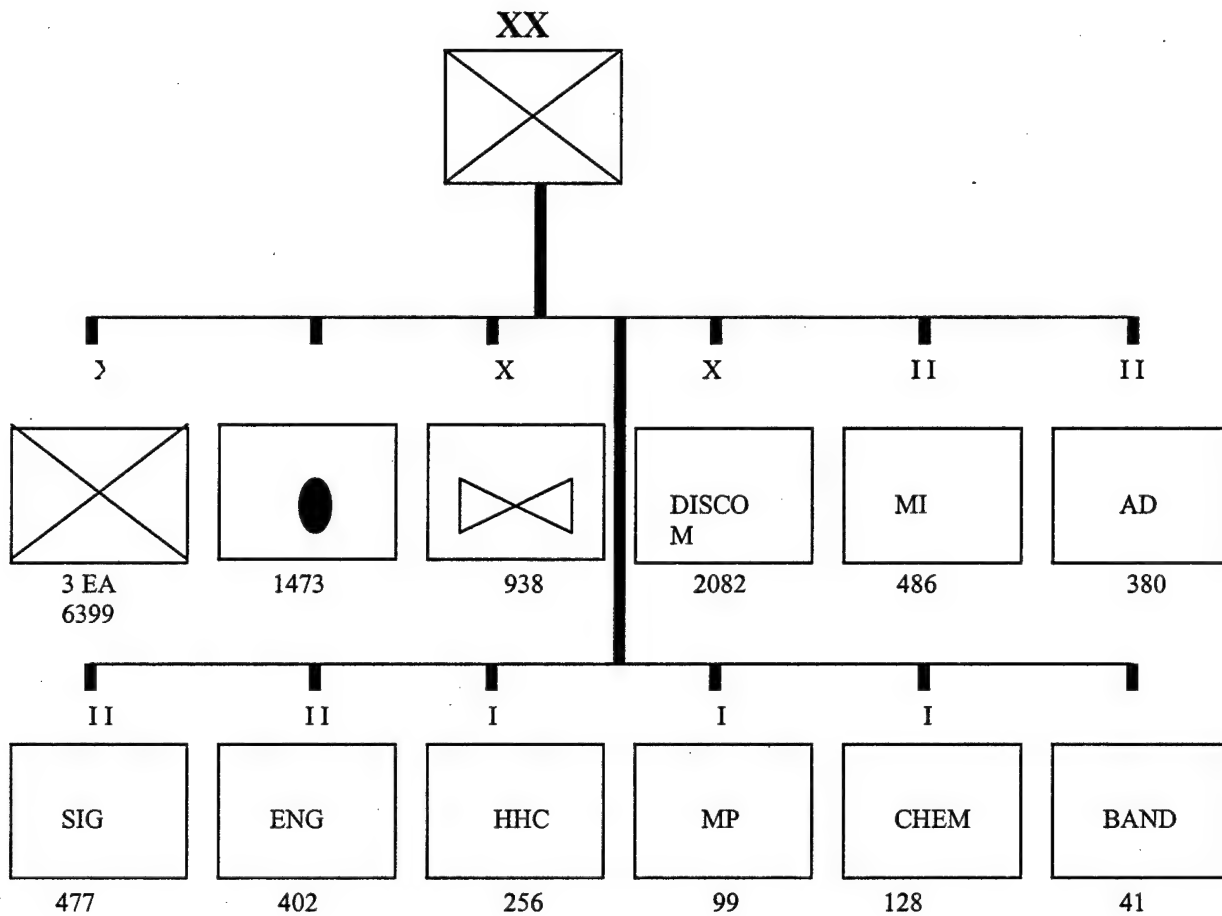
### **The Airborne Division**

There is only one airborne division in the U.S. Army—the 82<sup>nd</sup> Airborne Division. This rapidly deployable unit is capable of forcible entry, a key component of the Army's doctrinal tenet of force projection. The mission of the division is to conduct parachute assaults to destroy the enemy and to seize or hold objectives until joined by the main force. The 82<sup>nd</sup> Airborne division is trained to fight across the full range of military operations. The force can be used in a theater to attack and seize objectives at the operational level (i.e. airstrips, bridges, or command and control nodes). Missions using the 82<sup>nd</sup> Airborne Division are planned for a maximum of 72 hours after insertion before aerial supply or ground link-up are required (Smith, 1996:157, 159).

The 82<sup>nd</sup> Airborne Division is characterized by quick response on short notice. The essence of its power is reliance on air or sealift to bypass land and sea obstacles, giving the division the ability to mass quickly from any direction upon a key target. Historically, the simple alerting of airborne forces for possible employment has succeeded as a strong show of force. In addition to airborne troops, the division maintains a modern communications suite and utilizes organic parachute riggers and

pathfinders. The full division contains approximately 22,000 short tons. Full mobilization requires 5 Fast Sealift Ships (FSS) (Smith, 1996:157, 159) or 51 C-141s, 78 C-17s and 25 C-5's (Salice, 1997:8). While the C-130 has been used to move portions of the 82<sup>nd</sup>, actual numbers to move the division are not available—the C-130 has never been considered a sufficient asset to deploy the entire division.

While quick and lethal, the airborne division suffers from several limitations. The division is vulnerable to attack while enroute to the drop zone, has limited staying power once inserted, and suffers from a lack of mobility and anti-armor capability on the ground (Smith, 1996:157, 159). The figure on the following page provides a depiction of the organizational structure of the airborne division.



- 13,163 SOLDIERS
- 2627 VEHICLES
  - 54 SHERIDANS (inactivated in 97 (Childers, 1998))/ 108 TOW / 162 DRAGON
  - 54 105 MM HOWITZERS (TOWED)
  - 49 OH-58D / ADDITIONAL 56 OTHER HELICOPTERS

Figure 1. Airborne Division (Smith, 1996:159).

## **Airborne Division Capability**

There has been spirited debate on the future of the airborne force. Reduction or elimination of the airborne division from the Army force structure is a very real possibility in light of recent budget and subsequent personnel cuts. One of the major questions facing military leadership is whether the airborne division is currently designed and equipped to perform the forcible entry mission described in JV 2010. Lt Col Michael J. Kazmierski, a recent Army War College graduate, claims that modernization of the airborne division lags far behind that of other Army forces. He proposes that unless the Army takes steps to modernize the airborne division now, the airborne division will lack the tactical mobility, lethality, and survivability to dominate the future battlespace (Kazmierski, 1997:7).

The Army recently reduced from 18 active divisions to 10 active divisions. This makes the airborne division 10% of the Army's force. But the airborne division is not the only force capable of forcible entry. The Marines maintain this capability, claiming they can penetrate 600 miles inland from deployment and self-sustain for up to 30 days (Kazmierski, 1997:9). Because the current airborne division is reliant on securing an operational airfield in order to deploy the majority of its mobile assets, the mission of the airborne division begins to look similar to that of the Rangers (securing an airfield for follow-on airland forces (Kazmierski, 1997:9)). Any further reduction in Army divisions will make the option of retaining an airborne division while maintaining other forces which are capable of the same mission much less tenable.

Military leaders have repeatedly warned that the U.S. cannot expect to fight the next war in a similar fashion as the Gulf War. It is unlikely the U.S. will be afforded the opportunity for a massive buildup of forces in the theater over a large period of time. Instead, future conflict is likely to occur at the point of entry (Kazmierski, 1997:12). Heavily defended ports and airfields pose a serious challenge to airborne forces, especially in light of adversarial modernization over the past several decades. U.S. airborne forces will find themselves at a disadvantage facing threats of mechanized units, artillery, air defense, and missiles.

While the difficulty of an airborne force facing mechanized units is not a new problem, the Army is failing to keep the airborne division mechanized capability at a level which can compete with any adversary. The Armored Gun System (AGS) was to have replaced the 82<sup>nd</sup>'s aging Sheridan Light Tank (the only tank which can be airdropped from the C-130). Instead, the program was cancelled to save funds and the 82<sup>nd</sup> tank battalion was inactivated (Kazmierski, 1997:13). Armor support for the 82<sup>nd</sup> Airborne is now *required* to come from the C-17 or C-5, via airland or airdrop. With the viability of the SBA in question, airland delivery of armored support becomes the sole option. This means the airborne division is required to seize the airfield without armored support.

Recent training exercises have demonstrated light infantry and airborne forces' vulnerability to artillery. Lessons learned from the National Training Center (NTC) showed that light infantry forces in fortified survivable locations lost 59% of their combat power in just three hours when subjected to artillery barrage (CALL Pamphlet 89-2,

1989:12). Many countries are taking advantage of the glut of artillery pieces in the arms market, yet the airborne division is not spending funds for protection from this threat.

The risks of using the airborne division for forcible entry onto a well-defended target may be unacceptable. U.S. forces have historically proven the capability to gain air superiority over objective areas. The Gulf War proved that air superiority does not necessarily mean the elimination of mobile launchers and hand-held surface to air missiles. The U.S. Air Force has recently upgraded many of its mobility aircraft with air defense detection and chaff/flare systems, as well as increased the amount of training dedicated to threat avoidance. While these improvements undoubtedly make today's airdrop fleet much more survivable than those of the past, they do not guarantee 100% protection. The Army has historically accepted a 20% loss rate from the time of aircraft departure to the forming of the force on the ground. Yet, a 99% success rate for the aircraft performing the airdrop would still result in the loss of over 300 paratroopers and several multimillion dollar aircraft. Is the American public prepared for the cost associated with a 99% success rate? Increasing this rate to 100% requires the ability to successfully interdict all mobile and hand-held SAMs. The level of domination required to accomplish this objective begs the question of whether or not airborne insertion of forces remains a realistic option.

The airborne division does not possess an air defense system that is airdroppable. Instead, an airfield must first be seized, and then the air defense system can be delivered via airland. Airborne laser systems designed to intercept theater missiles are not yet operational. As many as 30 different countries maintain short-range missiles and the accuracy of these systems is rapidly improving. If forcible entry via airborne delivery is

to remain a viable tactic, improvements in the airborne division's air defense deployability must be made.

Lt Col Kazmierski summarized the plight of the airborne division prior to his argument for immediate modernization:

Yet when one considers the numerous future Third World threats...the future viability of this current strategy, requiring airfield security for the forcible entry, is questionable. Any combination of air defense, tanks, armored vehicles, long-range artillery, high performance aircraft, helicopters, precision munitions or missiles could be used to shut-off the flow of aircraft into the airhead before it is secured...The lack of tactical mobility would limit the airdrop elements of the airborne brigade from moving any distance to seize another airfield. So, can the current U.S. airborne division accomplish the 21<sup>st</sup> Century forcible entry mission? (sic) *NO, the current airborne forcible entry force does not seem to be designed or equipped to deal with future threats.*

## **Tiger Team**

Gen Kross, AMC/CC, chartered a Tiger Team in the summer of 1997 to obtain C-130 commander consensus on a long-term, success-oriented strategy for the C-130 weapon system. The Tiger Team briefed the results to General Kross in November of 1997. The briefing provided a current snapshot of the C-130 and described "what was broken" in the C-130 weapon system. The heart of the briefing included an in-depth analysis of how to repair major problems and a detailed investment strategy for the weapon system. The following information was derived from the command briefing presented by the Tiger Team to the Mobility Air Force commanders in December 1998. The discussion below does not relate to the capability of the C-130 as an airdrop platform, but rather to the capability of the C-130 as an airframe which can survive into the next century.

The Tiger Team stated the purpose of the C-130 from Joint Pub 3-17 as 1) a key component of power projection forces, and 2) a critical element of the force sustainment system. The mission of the C-130 is to move material, personnel, and units. This cargo may be combat or administrative and will be moved to the rear and immediate vicinity of enemy forces. The mission also includes reinforcing or resupplying forces already deployed or employed in combat operations and an aeromedical evacuation role.

In describing "what is broken" in the C-130 weapon system, the Tiger Team cited efforts of previous steering groups and then explained how they attacked the research. Soon after the move of the C-130's to MAC in 1974, a C-130 Action Steering Group was formed. While conducting research for this paper, I was able to present research to the Tiger Team showing the efforts of the Joint Action Steering Committee in August of 1991. The Mobility Concepts Agency also examined C-130 issues in September of 1995. These groups pursued similar purposes in their efforts to define theater airlift requirements, identifying C-130 training and qualification requirements, and determining OPTEMPO impact on C-130 personnel. Unfortunately the Tiger Team found no record of any team's recommendations or policy implementation.

In determining how to equip the C-130 force, the Tiger Team made several assumptions. The most important of these were the assumptions 1) the Air Force will continue to receive C-130Js at a level of 12 per year beginning in Fiscal Year (FY) 99 and 2) the active duty will begin to receive J-models in FY04. The C-130J is Lockheed Martin's newest model of the C-130. While the C-130J is currently the model being received, there is discussion on procuring the C-130J-30 in its place. This air-refuelable



C-130 has a total of 8 pallet positions, but more importantly, can airdrop 92 paratroopers—only 10 less troopers than a C-17 (Lockheed Martin, 1997:iii).

The Tiger Team faced a challenging task in describing the equipment status of the aircraft. C-130 aircraft capable of airdrop range in age from 38 years old to brand new. These weapon systems are distributed among AMC, ANG, AFRC, PACAF, AETC, and USAFE and consist of 532 aircraft. The wide range of age and command distribution forced the team to generalize equipment issues into broad categories.

Center wing service life is the number one driver for aircraft replacement. Using a model anticipating a 10% reduction in fuselage and center wing service life, the Tiger Team determined that 150 C-130s would be forced to retire by 2013. Other problems with equipment also exist. The current radar on all non-AWADS C-130E aircraft is the APN-59 (Ogden 1998) which uses 1950's tube technology and currently has a 50-hour mean time between failures. This high-maintenance system is causing support costs to increase by 17% per year. Also relying on tube technology is the autopilot used on the E, H, and H1 model C-130s. Mean time between failures for this equipment is 15 hours. The newer autopilot on the H2 and H3 models stopped being produced in 1995. Lack of contract support means reliability and parts supply will soon become a problem. The cockpit components reflect the average age of the C-130. The combined mean time between failures of the major gauges is 102 hours. Several of the components being added to the C-130 require new gauges. Only one model of AMC's C-130s, the H3, has night vision goggle compatible lighting.

A significant number of C-130s do not have an integrated GPS and rely on a self contained navigation system (SCNS) for position awareness. The memory of this system

is currently at 98% of capacity, making it difficult, if not impossible, to integrate additional equipment. The active duty C-130s should be fully equipped with integrated GPS by the end of next year (Ogden 1998)

The mainstay engine for the C-130E model is the T-56-A-7. Unfortunately this engine has been out of production for 25 years. Many parts are becoming obsolete and the number of vendors is rapidly diminishing. For instance, there is currently no source for turbine vanes for this engine.

As the Air Force attempts to keep pace with the rapidly changing requirements for aircraft equipment upgrades, the C-130 is falling behind. The Air Force Navigation & Safety Master Plan directed all passenger and troop carrying aircraft to install enhanced ground collision avoidance systems (E-GCAS), Traffic Collision Avoidance Systems (TCAS), and global positioning systems (GPS) by the year 2005. E-GCAS is being introduced at the approximate rate of one C-130 a month. TCAS is not yet funded (Ogden 1998), but the crash of a C-141 in 1997 has increased emphasis on Air Force-wide adoption of the equipment. The Global Air Traffic Management (GATM) mandate also required certain performance standards by the year 2005.

A common misperception is that the C-130 would probably not fly at the altitudes over the ocean governed by this ICAO regulation. In fact, GATM will apply to many of the overseas theaters to which the C-130 will be deploying. GATM has stringent navigation requirements including the ability to determine navigational accuracy to less than one mile, four dimensional navigation, and dual flight management systems and GPS. At this time the C-130 does not comply with the GATM navigation requirements.

The surveillance requirements of GATM include TCAS II with a Mode S capability and automatic dependent surveillance. Once again, the C-130 does not comply.

Addressing these modernization difficulties, the Tiger Team suggested a three-phase program to solve the C-130 equipment problems. Phase 0 would modify the aircraft with all prerequisite modifications. Phase 1 would upgrade the aircraft to the levels defined by the Air Force Navigation & Safety Plan and GATM. Finally, Phase 3 would make all of the required engine and APU modifications. Included in this plan was the proposal to consolidate the multiple models of the C-130 into two models—the C-130J and a compliant C-130"X" (the end result of modernizing C-130E, H, H1, H2, and H3 aircraft). By the year 2010, the Air Force would have 150 C-130J aircraft and 350 C-130"X"s. Using a cost analysis, the Tiger Team determined that upgrading the various models of the C-130 to the C-130"X" standard as a block modification would generate significant savings, as opposed to upgrading these aircraft piece by piece to the standards defined by the Air Force Navigation and Safety Plan and GATM. Results showed a \$.75B savings and reduced aircraft downtime by over half.

The Tiger Team also examined training problems in the C-130. According to the Tiger Team, the flight training units (FTU) cannot produce enough of the correct type of graduates. For FY98, programmed flight training produces 2335 aircrew members. The requirement is a production of 2400-2600 per year. The current training process has inefficiencies and current FTU simulators limit the type of events that can be accomplished in the simulator phase.

There are eight operational C-130 simulators at five different locations. Seven of these simulators are E-model simulators, although the E-model only makes up less than

50% of the C-130 fleet. These aging simulators continue to train at levels defined in the 1970s and do not meet current AMC standards. There are two new simulators slated for operation in 1998 and 1999. These simulators are H2 and H3 simulators and do comply with AMC standards. The requirement for crewmembers to conduct the bulk of their training in a simulator that has much different equipment than the plane they will fly is the cause of many of the FTU training deficiencies. H3 and H2 units spend between 80 and 150 hours with a student after he or she graduates from FTU in order to qualify that crewmember in the aircraft they will fly. The age of the simulators also forces much of the training that would normally be conducted in the simulator to be conducted in the aircraft. Night vision goggle, radio, and radar training are examples of areas where advances in the equipment onboard the aircraft have not been matched in the simulator.

The Tiger Team proposal recommends increasing the number of simulators to 17. The J-Model will be supported by five of these simulators, while the remaining 12 will support the compliant C-130"X". The team's proposal will allocate six of the simulators to the FTUs with the remaining dedicated to continuation training for flying units. This proposal provides a dramatic return on investment for training. The upgrade of aging simulators and addition of modern simulators will allow 50% of aircraft currency requirements to be accomplished in the simulator. Additionally, 30% of mission currency requirements would be accomplished in the continuation simulators. Finally, modernization of the simulators will result in a 12% reduction in aircraft sorties flown by the FTU.

The Tiger Team also noted a problem with the experience level of C-130 instructor pilots. While the Air National Guard (ANG) has managed to maintain an

experience level of 1329 average hours for its instructor pilots, the active duty Air Force has averaged a level of 147 hours over the past 6 years. A decline in pilot retention in the active duty Air Force is the major cause of this problem. However, a large number of exiting crewmembers are taking positions in the ANG and AFRC, and increasing their instructor hours.

Production of aircrew members is coming at a high cost to the active duty. The Air National Guard has approximately 200 instructor pilots, but only provides 3 instructor pilots annually to teach at the FTU. The active duty has only 73 instructor pilots outside the FTU and 33 of those pilots are annually slated for duty at the FTU.

The components and resources of the airborne forcible entry capability are aging. The airborne division is the most underfunded division in the Army. The C-130 currently falls short of the equipment upgrades required to operate in the next century. There are immediate infrastructure and training improvements necessary to maintain the C-130 fleet.

## **V. Requirements**

To discuss the requirement for both the airborne forcible entry requirement and the C-130's role in that mission, a review of the method of determining requirements is needed. Requirements in the military can be determined in several ways. The most common method is through the relationship of national strategy to the military planning system. Requirements are also determined through special studies. The Mobility Requirements Study Bottom-Up Review Update (MRS BURU) is an example of a study that determined baseline mobility requirements. Finally, there are requirements for peacetime that ensure forces are prepared to execute their wartime missions under the requirements stated above.

### **Relating National Strategy to Military Planning**

The relationship of national strategy to military planning is based on the National Security Strategy (NSS). This document is prepared by the President and is the source for the three major facets of military wartime preparation: planning, budgeting and preparation for execution. The planning function is the facet that relates to requirements and is called the Joint Strategic Planning System (JSPS). The JSPS is prepared by the Chairman of the Joint Chiefs of Staff (CJCS) and is the means for the CJCS to review the national security environment and the national security objectives, as well as evaluate the existing and predicted threats, and assess current strategy. Using this analysis, the CJCS can assess existing and proposed programs and budgets to propose military strategy, programs and forces (National Strategy and Military Planning, 1996:4).

The JSPS produces five products. The first is the National Military Strategy (NMS). The NMS assists the National Command Authority (NCA) in providing strategic direction for the military and to prepare strategic plans. This document also provides guidance used in the development of the Joint Strategic Capabilities Plan (JSCP) and Joint Planning Documents (JPD). The second product of the JSPS is the Joint Strategy Review (JSR). This is a continuous process that assesses the near and long term strategic environment for issues and factors affecting the NMS. This process facilitates integration of strategy, operational planning, and program assessment. The third product consists of the Joint Planning Documents (JPD). The JPDs are seven volumes of stand-alone documents addressing specific functional areas. They provide programming priorities, requirements, and advice to the Secretary of Defense during the preparation of the Defense Planning Guidance (the Defense Secretary's input to the Planning, Programming, and Budgeting System (PPBS)). The Joint Strategic Capabilities Plan (JSCP) is the fourth product of the JSPS and provides guidance to the JCS, the CINCs, and the Services to accomplish tasks and missions based on current military capabilities. This plan apportions major combat forces expected to be available to the CINCs. The JSCP is the principal vehicle by which the CINCs are tasked to develop OPLANS, CONPLANS, and FUNPLANS. The final product of the JSPS is the Chairman's Program Assessment (CPA). The CPA summarizes views of the CJCS on balance and capabilities of the force, and support levels required to attain national security objectives. The CPA allows for alternative program recommendations and budget proposals (National Strategy and Military Planning, 1996:4-8).

A detailed examination of the components of the requirements process is presented in Appendix A.

The result of the formal requirements process are the basic OPLANs, CONPLANs, and FUNPLANs. There are no OPLANs specifically tasking theater airborne forcible entry and there are only two CONPLANs that call for the use of aircraft to perform theater mass airdrop of personnel (C-130 Tiger Team VTC #2, 1997:4). On paper, the requirement for the C-130 as an airborne forcible entry platform is difficult to justify.

### **Defense Planning Guidance and Strategic Brigade Airdrop**

The Defense Planning Guidance (DPG) outlines the requirement for the Strategic Brigade Airdrop (SBA). The SBA entails is to airlifting a brigade of airborne troops from the CONUS and deploying them directly into a combat zone several thousand miles away (Beaubien, 1997:2). This key Army requirement is a direct example of forcible entry and is highly dependent on Air Force airlift.

The key difficulty with the SBA requirement is that it cannot be performed at this time. The SBA requirement is to be fulfilled by strategic airlifters (C-17, C-5, and C-141). A recent study performed by the Air Mobility Command's Studies and Analyses division showed that the Air Force simply does not have the strategic capacity to perform the mission. Furthermore, the division estimated that the Air Force would not be able to comply with the classified distance specified in the DPG until the year 2015 (Klumm, 1996:36).



While the Air Force cannot meet the Army's full requirement for SBA, the C-130 has shown great promise in filling the gap. The 1994 Operation UPHOLD DEMOCRACY was a brigade airdrop (although strategic distances were not involved). During this operation, C-130s deploying with the 82<sup>nd</sup> Airborne from Pope Air Force Base provided the bulk of the airlift fleet for the planned drop.

The SBA requirement does not include C-130s, but doctrine and reality show a need for the airframe. As previously stated, JP 3-18 states that forces will most often stage from an intermediate location for forcible entry operations. Based on this premise and the clear lack of strategic aircraft available to perform the SBA, the position of the C-130 as a valuable part of SBA in the foreseeable future appears secure.

### **Special Studies**

The defense department is required to perform a broad review of strategy and capabilities on a quadrennial basis. The 1993 Bottom-Up Review was the first comprehensive examination of the roles and missions of a post-Cold War military. A follow on study resulting from the BUR was the Mobility Requirements Study (MRS). This study focussed primarily on the transportation and mobilization assets of the military. While comprehensive in nature, the study neglected to account for the requirement for intratheater mobility. The Intratheater Lift Analysis (ILA) is a follow-on study based upon the MRS BURU that addresses aspects of theater operations neglected by the BUR (Intratheater Lift Analysis, 1996:1). The C-130's airdrop role is numerically defined in this document. While the fact that the C-130 is specifically assigned an

airdrop role in this analysis is unclassified, the actual numbers of aircraft required is classified.

### **The U.S. Army Peacetime Airdrop Requirement**

The U.S. Army maintains over 43,000 authorized paratroop billets within its force. Of this total, 21,000 are 18<sup>th</sup> Airborne Corps billets and 12,000 are allocated to the Special Forces/Ranger units. Forces Command (FORSCOM) models estimate a total of 11,111 C-130 equivalent sorties a year in order for these billeted positions to remain static-line jump qualified. In addition, the Army requires 2,300 high altitude/low opening and high altitude/high opening (HALO/HAHO) C-130 drops, 1,100 heavy equipment drops, and 1,700 container delivery system (CDS) drops. This total of 16,211 Army events requiring C-130 sorties is approximately 85% of the total events (19,000) requiring C-130 sorties throughout the military. The current aerial delivery training in the Army relies heavily on the C-130 (Voellger, 1997:1).

The Air Force has substituted C-141, C-5, and C-17 aircraft in place of the C-130 on a regular basis. Historically, these aircraft have accomplished 2,500-3,000 of the total C-130 equivalent sorties per year. Efforts to increase the number of events accomplished by these aircraft have been unsuccessful for two reasons. First is aircraft availability—C-130s have been required to accomplish the events because the other aircraft were needed for strategic airlift events. Second, the larger aircraft have been unable to perform the mission within the constraints of Army requirements (Voellger, 1997:1). For instance, the C-5 is not allowed to drop personnel and the C-17 requires 40,000 feet between formation elements of personnel.

Data analyzed from 1995 and 1996 showed the average flying hours per airdrop event was 2.5 hours. The C-130 flew 24,000 JA/ATT hours per year. Dividing the average hours per event into the total hours flown, results in 9,600 events flown by the C-130 force. Subtracting 2,500 events by strategic airlifters from the 19,000 events requiring C-130 equivalents gives 16,500 events for the C-130 to fill. Even though the C-130 is filling only 58% of the current Army requirement the Army has not criticized the Air Force on this current level of C-130 support (Voellger, 1997:1).

However, the impact of reducing or eliminating the C-130 airdrop function would drastically impact the Army's stated requirements. Current use of strategic airlift assets for JA/ATT support of the Army would fulfill only 22% of the stated C-130 requirement. Adapting Army training procedures to the larger aircraft could increase this total but does not solve the problem. If the major reason the larger aircraft could not fulfill the Army training requirements was because they were needed for their strategic role, then a reduction in the C-130 airdrop function fails to fill the gap. The C-130 does not have a strategic airlift role (Voellger, 1997:1).

## **VI. Alternatives**

The following discussion explores possible paths resulting from the debate over effective use of the C-130. The discussion serves to outline advantages and disadvantages of each course of action rather than recommend a specific alternative.

### **Eliminating Airborne Insertion as a Forcible Entry Operation**

The elimination of airborne insertion as a capability of US forces is a novel option that has received scant consideration. Proponents of airborne forcible entry argue the concept has been historically tested and proven successful. Airborne insertion is an important part of Joint and Army doctrine. The US military currently has a requirement for airborne insertion. While the capability to perform this type of operation is decreasing, US forces are still capable of performing airborne insertion.

As noted earlier, airborne insertion is a relatively new concept. World War II served as the proving ground, and despite huge losses in the beginning, the US military learned quickly and became experts in the mass delivery of paratroopers. During later conflicts, however, this capability was used sparingly. There are several reasons this has proved true. First, there was not always a need to deliver the troops by air. During Korea, amphibious assault proved a more effective means of forcible entry. Vietnam was an environment where airdrop proved necessary, but not on the mass scale seen during World War II. Grenada and Haiti are recent examples of conflicts where airdrop was determined to be the forcible entry method of choice. During Grenada, the insertion of airborne troops opened the airfield for the subsequent airland delivery of troops. Haiti

was a conflict where the mere threat of a mass airborne assault brought warring parties to the peace table. Second, the cost of aircraft has made the risk of airborne insertion greater. During WWII, with the US economy at full production, gliders and planes were relatively expendable. Today's limited budget and resources make the loss of a multimillion-dollar aircraft much less acceptable. Finally, as mentioned in the analysis of JV 2010, the general public's tolerance for loss of life is low. Mission success odds must be near 100% for airborne insertion to be considered as a viable option.

History has shown the mass airborne insertion of troops to be a unique and powerful capability—one that not only serves as a method of force projection, but also as a strong deterrent. Doctrinally, this forcible entry capability is firmly grounded. The mass airborne insertion of troops is one of three primary methods of forcible entry. Forcible entry is a strong component of force projection—one of the foundations of joint doctrine. Eliminating this capability would narrow the options available to the military and decrease our versatility in responding to crises. The Army would be left with only one option for forcible entry—air assault; however, the mission of the 82<sup>nd</sup> Airborne Division would become obsolete.

Elimination of this capability would also force requirements to be adjusted. Obviously, the ability to project power through forcible entry would remain an important requirement for the Army and Marines. OPLANS and CONPLANS would need to be studied and revamped so that one of the two remaining forcible entry capabilities was used. Theater commanders would be forced to reevaluate their Joint Mission Essential Task Listings. Finally, quadrennial reviews and follow-on studies would greatly affect

the structure of the Air Force. The peacetime support requirement for mass airdrop of personnel would be eliminated, thus reducing the number of JA/ATTs.

The force structure of the Army would be changed. Elimination of this capability would make the Army's decision on how to reduce its number of divisions much easier. Lt Col Kamierski has described in detail the diminished capabilities of the airborne division (Kazmierski, 1997). The lack of a requirement to perform the airborne mission would prevent the Army from having to risk its most under-funded division in combat. Obviously, the monetary savings would be significant. The number of personnel required to maintain jump currency would be limited to special operations personnel. Elimination of the 82<sup>nd</sup> as a whole would obviously reduce Army costs.

The Air Force would need to reevaluate the missions of its airlift aircraft. The strategic airlifters would increase their ability to fulfill their strategic airlift mission. The lack of a requirement to keep the Army jump-qualified would allow these aircraft to focus on their core airlift mission. The number of aircraft and aircrews required to train for the airdrop role would decrease, as special operations would remain the only airdrop requirement left for which to train. The C-130's JA/ATTs and training requirements would be decreased by over 75%. There are already C-130s specifically designated for the special operations mission. The only remaining airdrop mission for AMC's C-130s would be intratheater airdrop—primarily the training and actual conduct of aerial resupply.

This raises the obvious question of how to properly utilize the large number of C-130s. Assuming the US maintains the ability to respond to two nearly simultaneous major theater wars, the Intratheater Lift Agreement (ILA) remains valid. As long as this

requirement exists, the number of C-130s currently in inventory should remain constant. This means there will be a necessity to keep these aircraft employed during peacetime. European and Pacific C-130s would continue to perform their role as theater airlifters. The decrease in airdrop training requirements would allow the theater C-130s to assume a greater role in delivering cargo in the theater. Strategic airlift aircraft would make a decrease in the number of channel stops, allowing the C-130s to deliver cargo to final destination. CONUS C-130s would also pick up a larger portion of CONUS airlift. While studies have shown that the C-130 is not the most effective CONUS airlifter, the cost of keeping the aircraft employed would be a part of the cost of keeping the C-130 prepared for its wartime mission. Assuming the ILA remains valid, there would be a requirement to keep the C-130 flying. Therefore, effectively employing the C-130 during peacetime would need to be addressed. One option available for study is the use of the C-130 to shuttle parts between depots and bases. Currently commercial sources are the primary method of transportation for this purpose. Factoring in the cost of keeping the C-130 flying might make the adoption of this role more cost effective.

### **Eliminating C-130 Aircraft from the Mass Airdrop Role**

Since the requirements to use the C-130 for mass airdrop of personnel are so vague, another option is to eliminate the C-130 from the mass airdrop role. Historically, this would be a radical mission adjustment for the C-130. From a doctrinal standpoint, the C-17, C-141, and C-5 could pick up all the airdrop responsibility while the C-130 assumed its intratheater lift duties. Major adjustments in OPLANS and CONPLANS

would not be necessary, as few changes in requirements would be needed. This option runs into serious feasibility problems, however, when the capabilities of the airlift fleet are examined and peacetime training requirements are analyzed.

Airdrop of personnel has been a rich chapter in the history of the C-130. C-130 aircrews have always taken pride in the fact that they could deliver their customer "anytime, anywhere". From Belgium to Vietnam, through Grenada and Haiti, the C-130 has proven the versatile personnel airdrop platform of choice. But the C-130 also has a strong history of aerial resupply and airland assault delivery. Airdrop of personnel is but one of the myriad of functions performed by the C-130. Elimination of the personnel airdrop mission from the C-130 would be a disappointment for those who have flown or are flying the C-130. However, the wide variety of other mission functions would allow the aircraft to continue its proud history.

Doctrinally, this concept would also work. The reluctance of AMC leadership to allow strategic airlifters to CHOP to the theater would have to be overcome. Both Joint and Army doctrine state that normal airborne forcible entry operations will make use of intermediate staging bases (Joint Pub 3-18.1 (draft), 1997:VI-12). It would be safe to assume that the theater commander would expect to have operational control of these forces. The remainder of the joint and Army doctrine pertaining to airborne forcible entry is not aircraft specific. Strategic airlifters could perform these functions as well as C-130s.

One of the major reasons this option looks appealing on paper is the lack of OPLANS and CONPLANS that include the C-130 in their operations. The Air Force has a clear responsibility to support the Army in the execution of forcible entry operations.



However, the type of plane used to provide this support is not specified. As long as the strategic airlifters can support the Army's personnel airdrop requirements and the C-130 can fulfill theater airlift requirements, this option appears sound with respect to fulfillment of requirements.

There are several major factors that make this option unattractive—and all of them relate to air fleet capability. First, the Air Force does not have enough strategic airlift in the near term to fulfill its million-ton-mile requirements, let alone perform mass airdrop of personnel (Bruno, 1997). Second, the Air Force does not have enough strategic airlift to perform its peacetime airlift requirements and train the Army's airdrop troops during peacetime (Voellger, 1997:1). Third, the Air Force does not have enough strategic airlift to perform a Strategic Brigade Airdrop (Klumpp, 1996:36). Finally, the Air Force has approximately 500 C-130s that can airdrop personnel, but have difficulty operating in a strategic airlift role. The strategic airlift force has struggled through safety and tactical problems to earn personnel airdrop certification, and is designed to perform strategic airlift. The C-141 is quickly retiring, the C-5 is not allowed to drop personnel, and the C-17 must have almost seven miles spacing between formation elements in order to drop troops (providing an airborne insertion rate unacceptable to the Army). Simply analyzing resource allocation, it does not currently make sense to drop the C-130 as part of the mass insertion of airborne troops. Without external navigation aids, the C-130 is the *only* aircraft that can drop personnel in adverse weather at an acceptable rate of insertion.

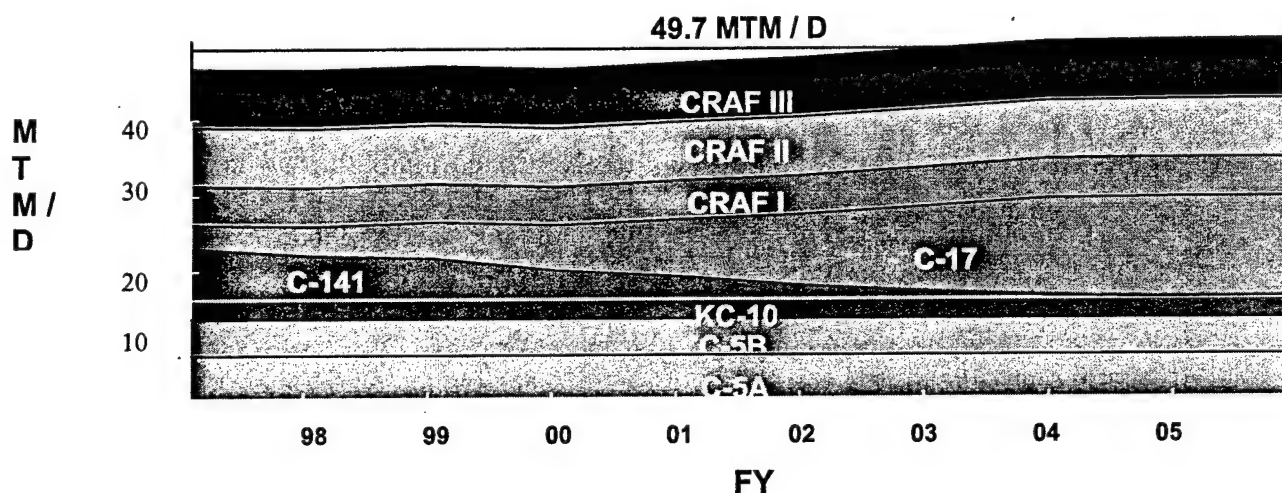
The chart below shows the required number of million-ton-miles (MTM) strategic airlift must provide in executing our national military strategy. The bathtub (initial gap

between the top of the CRAF III line and the 49.7 MTM/D baseline) at the beginning of the chart shows how far short of the million-ton-mile requirement the fleet falls.

Obviously this is worst case—the use of every available strategic airlifter to haul cargo and personnel in support of two major theater wars. This chart does not account for aircraft allocated for airdrop alert, aircraft performing actual airdrops, or aircraft training airdrop personnel. Any attempt to use these aircraft to perform airdrop would deepen the bathtub (Bruno 1997). As previously discussed, the C-130 performs approximately 85% of all flying JA/ATT hours—the Army’s primary method of training for airdrop.

Removing the C-130 from the mass airdrop role would put the burden of airdrop training

**FY 97-03**  
**CRAF = 20.5 MTM/D**



**Figure 2. Strategic Airlift Capacity (Bruno, 1997).**

on the strategic airlift community. This requirement to add more than 16,000 flying events a year to the strategic airlifters would cause a huge decrease in the number of

TWCF missions they could perform. Currently, strategic airlift units are being tasked at maximum amounts for normal channel missions and the on-going seven-year commitment in the Persian Gulf. Fulfilling these JA/ATT hours would require a decrease in support elsewhere. The C-130 would have limited ability to perform a strategic airlift mission—doing so would involve a large cost in time and efficiency.

The strategic airlift force cannot perform the requirements for a Strategic Brigade Airdrop (Klumpp, 1996:36). While this capability is predicted to exist by the year 2015, that does not mean we have to give up the ability to move a brigade right now. Through the use of a combination of C-130 and strategic airlift aircraft, and the use of intermediate staging bases, a brigade can be airdropped to a specified location in the theater. The next section will look at how the SBA capability may be attained sooner through the use of the C-130J-30 model.

The Air Force is currently receiving the C-130J (Air Mobility Master Plan, 1997:Roadmap 2). There has been discussion concerning replacing the C-130 with the C-130J-30—a stretch version of the C-130J. This version of the C-130 is the first that could feasibly augment the strategic airlift mission. The -30 has an unrefueled ferry range of over 4000 nm and a max payload range of 3000 nm. The aircraft is air-refuelable and can carry all current airdrop equipment. Every aircraft will be equipped with the Adverse Weather Aerial Delivery System (AWADS) giving the -30 instrument flight rules airdrop capability. One study of the SBA medium airdrop has shown that 90 -30s can complete the mission as opposed to 82 C-17s (Lockheed Martin, 1997:ii). If the -30 is obtained it is obvious that the Air Force will be required to examine the distinction

between tactical and strategic airdrop. The -30 would have a significant impact in freeing larger strategic airlifters to perform other missions.

### **The Status Quo or Partial Fleet Airdrop Qualifications**

The status quo leaves all C-130s in AMC airdrop qualified. Alternatively, it is possible to make a portion of the C-130 fleet airdrop qualified with the remaining aircraft performing airland functions only. The Tiger Team did exhaustive research on various fleet configurations with percentages of aircraft formation airdrop, single ship airdrop, and airland qualified. The result of their research was a recommendation to maintain the fleet 100% airdrop qualified. An examination of the various percentage fleet configurations the team studied is beyond the scope of this paper.

Maintaining the fleet 100% airdrop qualified can easily be justified by historical precedent, current doctrine, and the ILA. The C-130 has enjoyed a predominant role in every major airdrop since the aircraft was introduced. Although the concept of mass personnel airdrop has been considered in every conflict since World War II, its use has declined from conflict to conflict. To this day, however, mass personnel airdrop remains a unique capability and a powerful deterrent.

Doctrinally, the C-130's role in the personnel airdrop capability remains sound. Both Joint and Army doctrine repeatedly call for the maintenance of forcible entry capability. Joint doctrine recognizes the difficulty of performing forcible entry over strategic distances and still calls for deployment of this function from a forward operating base. The proximity of this forward operating base to the theater is key in determining the C-130's role in the forcible entry option.

Assuming the Air Force is funded for necessary C-130 equipment and infrastructure upgrades, the C-130 fleet will continue to maintain the capability of performing mass personnel airdrop. In fact, the introduction of the stretch C-130J offers the ability of the C-130 to perform mass personnel airdrop over strategic distances. It is conceivable that the C-130J could assume or augment the personnel portion of the strategic brigade airdrop. Deficiencies in the airborne division were discussed earlier in this paper. Any reduction or elimination of the airborne division or its resources would require an evaluation of the need to maintain the entire fleet airdrop qualified.

The overriding factor that will continue to plague Air Force leaders trying to either justify or eliminate the C-130 role in airdrop is requirements. The requirements are ill-defined and need to be made clear. Maintaining the C-130 fleet 100% airdrop qualified can be indirectly justified through the Intratheater Lift Agreement. The problem with this requirement is twofold. First, the airdrop requirement is a percentage of the classified number of C-130s required and is not specified as a personnel requirement (Intratheater Lift Analysis, 1996:1). The other difficulty is that the ILA was a subordinate study to the Mobility Requirements Study Bottom-Up Review Update (MRS BURU) (C-130 Tiger Team VTC #2, 1997:4). In turn, this study was a follow up to the Bottom-Up Review. This tenuous chain indirectly relates the requirement to National Military Strategy but hardly complies with normal process of requirements formulation. In light of the most recent bottom-up review, the Quadrennial Defense Review, a current mobility study (including intratheater requirements) needs to be conducted. This strategic direction by headquarters leadership would allow theater commanders to exactly determine the mobility requirements in their own theaters. These

should flow up to the headquarters in the form of Joint Mission Essential Task Listings and allow resource managers to work with clear, well-defined requirements.

## **VII. Conclusion**

This paper presents three alternatives for the C-130's role in airborne forcible entry operations. Although no overall recommendation is provided, several major factors appear to be influencing the viability of these alternatives. First, the C-130 has been counted on in most major contingencies to either perform the airdrop function or be prepared to perform this function, yet theater commanders have not specifically identified theater airdrop in their OPLANS or CONPLANS, suggesting there is no requirement for C-130s to remain personnel airdrop qualified. Second, joint and Army doctrine supports the use of the C-130 for the forcible entry capability, while the Air Force appears to be shying away from clearly defining Army support functions in its doctrine. Third, financial constraints have raised questions about the practicality of the airborne division in the future, yet prospects are good for funding necessary C-130 upgrades. Finally, despite the ill-defined personnel airdrop requirements, the C-130 continues to train for this function.

Although many factors appear to be influencing the process of clearly defining the C-130's role in airborne forcible entry operations, the Army's lack of clear requirements appears to be the most significant obstacle. This paper has shown that documented requirements for the C-130 in the Army personnel airdrop role are almost non-existent. As military budgets are continuously reduced, it becomes impractical for the Air Force to continue C-130 support of the Army without a better definition of the support required. In fact, the major reason the C-130 has not been pulled from this role is because the Air Force cannot support the Army's peacetime airdrop requirements without the C-130. What decisions the Army makes concerning its aging airborne division will directly

determine the future of the C-130 and its airborne support role. Any cuts in this airborne division could alter the distribution of C-130 airdrop qualification. One extreme calls for the complete elimination of airborne operations as a component of forcible entry. A less severe alternative involves the reevaluation of airborne forcible entry and subsequent rewrites of requirements, to include OPLANS and CONPLANS.

Introduction of the stretch C-130J will complicate this process. An increase in capability prior to a reevaluation of requirements is likely to cause leadership to match requirements to the new capabilities. The stretch C-130J would allow the Air Force to free key components of the strategic airlift force as the new model of C-130 augments the SBA requirement.

Several topics introduced in this paper merit further research. The elimination of the airborne division and the airborne forcible entry capability is rarely discussed—the operation is ingrained in Army culture. Future war, however, will not support the mass casualties associated with such operations. Reexamining forcible entry techniques provides a point of departure for further research. The introduction of a small plane that can perform strategically—the C-130J-30—requires the same type of doctrinal evaluation the C-17 received when it came on line. We are just learning how to use a strategic asset that operates in a tactical role. The C-130J-30 is the inverse of the C-17; a tactical asset which can perform a strategic role. Finally, a study of what to do with the C-130 if it does not perform personnel airdrop would be valuable. Should the aircraft be retired or used in an alternative role? These questions merit further research and are the problems that an Air Force with scarce resources and competing requirements must answer.



## **Appendix A: Requirements**

### **National Security Strategy**

The protection of U.S. security, including U.S. citizens and their way of life is the mission of the Administration as outlined in the 1995 National Security Strategy. The threat of communist expansion has been replaced with the dangers of ethnic strife, the continued proliferation of weapons of mass destruction (WMD), and the hazards of overpopulation in an overtaxed environment. The central goals of the National Security Strategy are:

- To protect our security through the maintenance of a military force that is ready to fight.
- To enhance U.S. economic growth.
- To actively engage abroad, encouraging the growth of democracy.

The first and third objectives relate directly to the military. The National Security Strategy recognizes the military as “an independent element of our nation’s power” (National Security Strategy, 1995:ii) that must maintain the capability to fight and defeat our adversaries. The document also stresses the importance of deterring aggression abroad. The baseline military capability to which the Administration commits itself resulted from the Bottom-Up Review (BUR). According to the National Security Strategy, the President put forward a defense budget for the years 1996-2001 based on the findings of the BUR and he “will draw the line against further cuts that would undermine that force structure or erode military readiness (National Security Strategy, 1995:3).

It is often difficult to relate national strategic vision with an operational maneuver such as the mass airborne insertion of troops. There is a correlation, however, between the National Security Strategy's determination to maintain a highly versatile force ready to actively engage outside the borders of the U.S. and the powerful forcible-entry maneuver of airborne operations. Giving up the maneuver results in both a loss in military capability and a diminished deterrence stance.

### **National Military Strategy**

The Joint Chiefs of Staff published a complementary document to the National Security Strategy, entitled The National Military Strategy. To support the National Security Strategy goals of engagement and enlargement, the military will use its flexible force to accomplish the objectives of promoting stability and thwarting aggression. The three components of this strategy are "peacetime engagement, deterrence and conflict prevention, and fighting and winning our Nation's wars" (National Military Strategy, 1995:I). The last two components of the strategy have a direct relationship to the airborne troop insertion capability of the U.S.

Deterrence and conflict prevention is accomplished through efforts to deter threats to our security and national interests. Key components of this strategy that relate to the airdrop capability are crisis response and peace enforcement. Crisis response is designed to rely on the capabilities of troops stationed or deployed overseas as the first option (National Military Strategy, 1995:11). Since crises are assigned according to the proximity of the crisis to the nearest theater, theater airlift would have a definitive role in the contingency. Peace enforcement often requires the insertion of U.S. forces before

hostilities in the affected country have ceased. The launch of massive formations of C-130s to airdrop the 82<sup>nd</sup> Airborne Division in Haiti is an example of a forced entry operation for the purposes of peace enforcement. The fact that these forces were allowed to turn around before reaching their objective is an example of the powerful deterrent effect of airborne operations.

Fighting and winning our Nation's wars is the last component of the national military strategy. Wartime power projection and the requirement to fight our wars in a joint manner are the major components of this strategy that relate to the airborne delivery option. The U.S. anticipates the transport of troops and equipment from the CONUS to the theater of operations, and in some cases from overseas bases to augment those forces deployed forward. Once again, if this projection of power requires forced entry, C-130 aircraft could be used to either transport airborne forces from overseas bases or staging areas to the objective or to deliver forces that may have been delivered to forward bases by strategic lift. Fighting our wars in a joint manner has become an ingrained method of operation following the Gulf War. As the National Military Strategy states:

Land forces must be capable of deploying rapidly and, if necessary, executing forcible entry to seize the initiative and close with and destroy enemy forces...Air forces provide...global lift to rapidly deploy and sustain joint forces in theater. (National Military Strategy, 1995:14)

### **Joint Strategy Review (JSR)**

The JSR is a continuous process that assesses the strategic environment for issues and factors that affect the National Military Strategy (NMS) in the near-term or the

long-range. It continuously gathers information; examines current, emerging and future issues, threats, technologies, organizations, doctrinal concepts, force structures and military missions; and reviews and assesses current strategy, forces, and national policy objectives. The JSR facilitates the integration of strategy, joint operation planning, and program assessment. When significant changes or factors in the strategic environment are identified, JSR issue papers are presented to the Chairman of the Joint Chiefs of Staff, the Chiefs of the Services, and the combatant commanders. These papers will provide entering arguments for proposed changes to the NMS, Joint Planning Document (JPD), and JSCP and solicit the Chairman's guidance for changing the military strategy if required (Joint Publication 5-0, 1995:II-4).

### **Joint Planning Document**

The JPD supports the NMS by providing concise programming priorities, requirements, or advice to the Secretary of Defense for consideration during preparation of the DPG. Published as stand-alone documents addressing specific functional areas, JPD volumes are coordinated and collaborated with the Chiefs of the Services, combatant commanders and Defense agencies, and serve as a conduit for input to the DPG (Joint Publication 5-0, 1995:II-4).

## **Joint Strategic Capabilities Plan**

The JSCP provides the strategic focus required to coordinate the planning efforts of the combatant commanders in pursuit of national strategic objectives and to mesh their efforts with those of the remainder of the joint planning community. The JSCP is the link between strategic planning and joint operation planning. It is the method through which the Chairman of the Joint Chiefs of Staff exercises his responsibility to provide for the preparation of joint operation plans. The JSCP is the instrument which begins deliberate joint operation planning by assigning planning tasks to the combatant commanders, apportioning major combat forces and resources, and issuing planning guidance to integrate the joint operation planning activities of the entire joint planning community within a clear, focused framework (JP 5-0). The JSCP provides guidance to the JCS, CINCs, and Services on what capabilities to be proficient in (Joint Publication 5-0, 1995:II-4). This document is the guidance that tells the Army they are required to maintain the capability for airborne operations.

An examination of the inside of the JSCP outlines the steps involved in formulating requirements. The JSCP assigns the combatant commander to develop deliberate plans and allocates forces and resources for planning purposes. It contains availability times (provided by individual services) for major combat forces designated to augment combatant commands. The mobilization annex of the JSCP provides instruction to the Services for the development of supporting mobilization plans for those contingencies that require mobilization. The combatant commanders, either directly or through their component commands, identify requirements not listed in the JSCP but deemed necessary to support joint operations. These identified forces are provided by the individual

services (Joint Publication 5-0, 1995:II-5,6). The military has recently begun to adopt the Army's method of defining these requirements in the form of Mission Essential Task Lists (METLs). Joint METLs (JMETLs) are the combatant commander's consolidation of each of his component command's METLs. JMETLs identify the performance of specific tasks required to execute the combatant commander's plans and are used by the CINCs and the Joint Staff to identify and fund joint training, determine the focus of joint doctrine development, and provide joint justification for various programs (Tritten, 1997:1). The next step is for the combatant commander to develop OPLANs or OPORDs encompassing service-provided mobilization information. Each of the services develops detailed mobilization plans to support the OPLANs of the combatant commanders. Finally, the Chairman of the Joint Chiefs of Staff reviews the OPLANs of the combatant commanders to determine the effect of mobilization capabilities on the sufficiency and feasibility of joint OPLANs (National Strategy and Military Planning, 1996:4).

### **Chairman's Program Assessment**

The Chairman of the Joint Chiefs of Staff assesses the overall balance and adequacy of the composite programmed force and support levels in light of approved strategy and the inputs of the combatant commanders and documents this assessment in the Chairman's Program Assessment (CPA) (Joint Publication 5-0, 1995:II-5).

## **Joint Operations Planning and Execution System (JOPES)**

From the strategic level it is obvious there is a requirement for the Army to perform the airborne forcible entry option. There is also a requirement for the Air Force to support training and execution of that maneuver. There is not, however, any requirement for the C-130 to perform that function. To determine the requirements for specific aircraft to support airborne forcible entry, it is necessary to look at the plans for how the military will go to war. An examination of the Joint Operations Planning and Execution System (JOPES) and the Joint Mission Essential Task Listing process will highlight Air Force requirements for airborne support by specific aircraft.

JOPES is an integrated joint command and control system designed to plan and execute joint military operations. The system standardizes the contents of OPLANS, and CONPLANS, as well as policies, procedures and deployment data. JOPES is based on the War and Mobilization Plan (WMP), a five-volume set that provides current policies, forces, and planning factors for conducting and supporting wartime operations. The volumes which relate to specific aircraft are volumes 2 and 4. WMP-2 lists the USAF and MAJCOM war and contingency plans, as well as the Unified command plans for which the USAF provides support. WMP-4 contains the Wartime Aircraft Activity (WAA) guidance reflecting the most current MAJCOM planning, positioning, and employment activity of aviation forces in support of OPLANS. The document also shows planning, positioning, and employment of AF aircraft by OPLAN, base, major weapon system (MWS), and mission (National Strategy and Military Planning, 1996:17-24).

## Bibliography

- Beaubien, Capt Seth. Rethinking Strategic Brigade Airdrop. Graduate Research Project, AFIT/GMO/LAC/97Y-1. Advanced Studies of Air Mobility, Ft. Dix AIN NJ. April 1997 (AD-A330287).
- Boston, Ronald G. The Historical Origins of Tactical Airlift. Air Command and Staff College, Air University, Maxwell AFB AL. 1982.
- Bruno, Lt Col Robert. Chief, Mobility Division, Air Mobility Warfare Center, Ft. Dix NJ. Personal interview. 8 May 1998.
- Bruno, Lt Col Robert. Class Lecture, Civil Reserve Air Fleet (CRAF) Brief. Air Mobility Operations Course, Mobility Division, Air Mobility Warfare Center. Ft. Dix NJ. Summer 1997.
- Class Lecture, National Strategy and Military Planning. Air Mobility Operations Course, Mobility Division, Air Mobility Warfare Center, Ft. Dix NJ, Summer 1997.
- C-130 Tiger Team Video Teleconference #2. C-130 Tiger Team, Air Mobility Command, Scott AFB IL. 10 September 97.
- "C-130 Tiger Team Final Report." Report to HQ USAF, Washington DC. January 1998.
- Center for Army Lessons Learned. Heavy-Light Lessons Learned. Fort Leavenworth KA. 1989.
- Childers, Sgt Travis. G-1 Strength Management, 82<sup>nd</sup> Airborne Division, Ft. Bragg NC. Telephone interview. 8 May 1998.
- Dabney, Joseph E. Herk: Hero of the Skies. Marietta: Larlin Corporation, 1986.
- Department of the Air Force. Air Force Basic Doctrine. AFDD 1. Washington: HQ USAF, September 1997.
- Air Force Basic Doctrine. AFDD 2. Washington: HQ USAF, September 1997.
- Department of the Army. Operations. Field Manual 100-5 (Draft). Fort Monroe: TRADOC, 4 Apr 1997.



Headquarters Air Mobility Command. Air Mobility Master Plan (AMMP). Scott AFB IL: October 1997.

Israelitt, L.M. Industrially Funded C-130 Airlift Operations. Staff Summary Sheet for Message from CJCS to CSAF. 1976.

Joint Chiefs of Staff. Intratheater Lift Analysis. Washington: JCS, July 1996.

----- Doctrine for Joint Operations. Joint Publication 3-0. Washington: JCS, 1 Feb 1995.

----- Joint Tactics, Techniques, and Procedures for Theater Airlift Operations. Joint Publication 3-17. Washington: JCS, 1995.

----- Joint Doctrine for Forcible Entry. Joint Publication 3-18 (Draft). Washington: JCS, 4 March 1997.

----- Joint Airborne and Air Assault Operations. Joint Publication 3-18.1 (Draft). Washington: JCS, In Development.

----- Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations. Joint Publication 4-01.1. Washington: JCS, 1997.

----- Doctrine for Planning Joint Operations. Joint Publication 5-0. Washington: JCS, 13 April 1995.

----- Joint Vision 2010. Washington: JCS, 1994.

----- National Military Strategy of the United States of America. Washington: JCS, 1995.

Kazmierski, Michael J. The U.S. Airborne Forcible Entry Capability Is Rapidly Becoming Obsolete (We Must Modernize Our Airborne Forces). Strategy Research Project. U.S. Army War College, Carlisle Barracks PA, 1997.

Klumpp, Maj Richard A. Jr. Strategic Brigade Airdrop: Past. Present. Future? AFIT/GMO/LAL/96N-6. Graduate Research Project, Advanced Studies of Air Mobility, Ft. Dix NJ, November 1996 (AD-A320328).

Kosiak, Steven M. Nonproliferation and Counterproliferation: Investing for a Safer World? Defense Budget Project. Washington: 1995.

Kross, Walter, Commander, Air Mobility Command. "The DIRMObFOR." Presentation to Director of Mobility Forces (DIRMObFOR) Seminar. Air Mobility Warfare Center, Ft. Dix NJ, August 1997.

Launius, Roger. "Significant Events of the C-130." Office of MAC History, Scott AFB IL, 1990.

- Lockheed Martin. C-130J-30. Promotional Pamphlet. 1997.
- MAC Comptroller Office. The Airlift Service Industrial Fund. Airlift (AOS/DTP), Scott AFB IL, 1990.
- Matthews, James K. and Cora J. Holt. So Many, So Much, So Far, So Fast. Joint History Office, Office of the Chairman of the Joint Chiefs of Staff and Research Center, United States Transportation Command, 1996.
- McCants, Arthur W. U.S. Air Force Oral History Interview, Gen William G. Moore, Jr. USAF Historical Research Center, Maxwell AFB, 1981.
- Moore, Samuel T. Tactical Employment in the U.S. Army of Transport Aircraft and Gliders in World War II; a Study Based on Histories of Troop Carrier Command and Other Pertinent Data. Langley Field VA, HQ Tactical Air Command, 1946.
- Office of Air Mobility Command History. History of Air Mobility Command, 1 Jun 92 – 31 Dec 94. Scott AFB: AMC, 1995.
- Ogden, Major James. 314 Air Wing, Little Rock Air Force Base, Jacksonville AR. E-Mail Correspondence. 18 May 1998.
- Powell, Colin L. "A Doctrinal Statement of Selected Joint Operational Concepts." Memorandum to Lead Agencies of Joint Service Publications, JCS, Washington DC. 10 November 1992.
- Salice, Lt Col Henry and Maj Michael Thayne (USAF). Strategic Brigade Airdrop. Requirements and Assessment Division, Headquarters, United States Army, Washington DC Fall 1997.
- Smith, William T. Forces and Capabilities—WS 631, Army Organizations and Capabilities. Air War College Associate Programs—Vol III, Doctrine, Forces, and Organization—WS631AP. Maxwell AFB AL, 1996.
- Tritten, Dr. James T. "Joint Mission-Essential Tasks, Joint Vision 2010, Core Competencies, and Global Engagement: Short versus Long View," Air Chronicles, XI:3, 32-39 (Fall 1997).
- Underwood, Jeffery S. Military Airlift Comes of Age: Consolidation of Strategic and Tactical Airlift Forces Under the Military Airlift Command, 1974-1977. Office of MAC History, Scott AFB IL, 1989.
- USAF Historical Studies: No. 97. Airborne Operations in World War II, European Theater. Washington DC, September 1956.

Voellger, Maj Gen Gary A. "DO-702390, Army's Peacetime C-130 Requirement — Reply." Electronic Message. 6 Jul 1997.

White House. A National Security Strategy of Engagement and Enlargement.  
Washington: The White House, February 1995.

### Vita

Captain Cameron W. Torrens was born on 28 September 1965 and raised in Montesano, Washington. He graduated from Montesano High School in 1984 and entered undergraduate studies at the United States Air Force Academy in Colorado Springs, Colorado. He completed his four years at the Academy in 1988 with a Bachelor of Science degree in Engineering. He completed a Master of Science degree in International Relations from Troy State University in 1994.

Upon graduation from Undergraduate Pilot Training at Williams AFB, Arizona, he was assigned to fly C-23s at Zweibrucken AB, Germany. In 1991, he was reassigned to Rhein-Main AB, Germany where he flew as a C-130 Instructor Pilot. He crossflowed to the KC-10 in 1994 and flew as an Evaluator Pilot until his departure in 1997. He was then selected by Air Mobility Command to the fourth class of the Advanced Studies in Air Mobility.

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13. ABSTRACT (Maximum 200 words) <p>The purpose of this paper is to study the argument over the best use of AMC's newest asset--the C-130 Hercules. History and doctrine appear to support the use of the C-130 in the airborne forcible entry mission. Ill-defined requirements and diminishing capabilities of both the C-130 and the airborne division support the search for an alternative mission for the aircraft. History, doctrine, capability, and requirements for the C-130 to perform personnel airdrop are examined.</p> <p>The conclusion examines several alternatives that could logically result from this debate. These include: 1) the elimination of mass airborne personnel drops as a valid method of forcible entry 2) maintaining this capability, but eliminating the role of the C-130 in this mission, and 3) maintenance of the status quo--continued C-130 support for the airborne division.</p>			
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